Physics 121
General Course Information
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Course Description

Physics 121 is the first part of a one-year calculus-based introductory course in physics. The course is required for chemistry majors, physics majors and engineering physics majors. It satisfies most pre-medical requirements and covers material commonly included in the M-CAT exams. The main topics covered are energy and momentum conservation, collisions, angular momentum, Newton's Laws, oscillatory motion, classical thermodynamics, and statistical mechanics.

Prerequisites and Corequisites

Concurrent enrollment in Calculus (or credit in Calculus I) is required for this course. In addition, a thorough working knowledge of algebra and trigonometry is vital for your success in this course. If you are concerned with your algebra or trigonometry skills, contact your instructor soon.

Course Objectives

The objectives of this course are to introduce you to three very important concepts in physics that govern the way nature behaves, Conservation laws, Newton's Laws and Thermodynamics. In this course you will be introduced to these three concepts and will learn to use these ideas to study physical systems.

In order to master these concepts, you will also learn to become expert problem solvers and active readers. These are two very difficult skills to develop, however once you do master them, you will find yourself applying these skills in **all** sorts of different areas, from other courses (even non-science courses) to job related activities. You will find that, at the beginning of the term, you will probably struggle more with learning these two skills than you will with the Physics ideas we will be starting with. Please take advantage of the opportunities we will provide to help you build these skills early.

Reading

The textbook for this course is *Six Ideas that Shaped Physics* (Units C, N, and T) by Thomas Moore. They are available from the bookstore. This structure and style of this textbook is very different from the traditional college science books. It is designed such that a chapter is to be read **before** coming to class each day.

The author has taken great pains to write a book that is read actively. By active reading, we mean that you should read book and write comments and questions in the margin. You should work through the exercises in the text that are designed to reinforce the ideas in the preceding sections, writing down questions as you encounter them. After completing the reading, you should read the summary and then go back through the chapter to clarify any ideas from the summary that did not make sense. You should then come to class prepared to discuss the chapter and ask questions about the ideas that the book did not express in a way that you understood.

Reading assignments are intended to help you develop critical reading skills, your knowledge of physics, and your ability to communicate that knowledge. They will be given every lecture day via CAPA and will be due at 8am before each class period. Quite frequently, students will do very well on the homework where they are working in groups and where quite often, only the final numerical result is required. However, these students don't do well on the first test because they lack the ability to communicate their knowledge of the subject in a clear and concise way. The reading assignments are one of the ways in which you will learn the concepts that are necessary to demonstrate your knowledge of the subject. They will also help you identify the topics in which you need to build more skills.

Reading questions and in-class quizzes will count for 10% of your grade.

Plagiarism Alert for reading questions. If you copy a phrase, sentence, or paragraph from the text you must indicate that your answer is not your original work. This is done by using quotation marks and, to keep things simple, just the page number in the text where the material is found. Failure to do so will result in academic sanctions.

Lectures

You are expected to bring your textbook, a pencil, and a calculator to each class period. There is no attendance requirement but generally students that skip class, even occasionally, do not have success.

Discussion Section

The purpose of the discussion section is to improve your problem solving skills and test-taking abilities. There will be quizzes but participation is more important than results in this part of the course. There will be an attendance requirement but if your homework and first test score are adequate, your continued participation in the discussion section will be optional.

Office Hours

The times when one of us will be available for help will be determined in the next few days. We request that you come for help and advice during these scheduled times. (We do not deal with questions by phone or email.)

Homework

Homework, as indicated in the syllabus, is due every Monday, Wednesday and Friday at 7:00 pm. Individualized problem sets are available from the CAPA system and answers are entered into the computer via the CAPA system. When you enter an answer into the computer, you are informed immediately whether the answer is correct or incorrect. You may retry any problem without penalty (up to 12 times at which point you must see your instructor) until you get it correct, or until the due date passes. Occasionally, there will also be some diagrams, short answers or proofs which will be graded by hand. These problems will be due in the homework box located in the hallway near the general physics lab by the due date of the assignment. No late work will be accepted.

Homework may be done in small groups with others from the class, if you are all working and learning together. While problems are similar, they are individualized and so you cannot just copy from each other. Working in small groups often will help you get through the problems with less frustration and help you to learn. However, you need to pay careful attention that you are not relying too heavily on someone else to always solve your problems. They will not be able to help you during the tests.

Because of the nature of the system, it is quite tempting to keep working on the homework problems until you have them perfect. (You may only enter a maximum of 12 tries into the CAPA system for each problem.) While we encourage you to work hard and learn the material well, we ask you to exercise restraint. Please do not spend 4 hours on your own struggling through the homework assignments. They are designed to take the average student 1 to 2 hours to complete. However, you should not spend more than 30 minutes on any single problem. If you have trouble with a problem or an idea, quit and find someone to help. There are several sources of help for the students in this class which are described in the next section.

Do not try to guess the answer. The CAPA system will only allow you to enter your answer 12 times. If you have tried the problem several times and still do not have the correct answer, you should seek out help.

Our best advice is to **start early**. This gives you the opportunity to spend some time on the problems, identify areas that are causing problems, and get assistance without getting caught in the stress of the deadline. Our other advice is that you use one sheet per problem. We feel so strongly about this that you will not receive office help with problems that are not presented in this manner.

The homework will count for 30% of your final grade.

Getting Help

We will work to provide student teaching assistants to provide extra help with problems but the times have not yet been schedules. Whether getting help from the assistants or us, please come with your work in hand that clearly shows what you have been thinking and attempting to accomplish. It is not very helpful for you to come for help saying that CAPA does not work for you without any work written down.

The Academic Support Center can also help to make arrangements for personal tutors for most courses. If you are finding that your classmates, the CAPA help room and our office

hours are not providing you with enough personal help, you should set up an appointment with the staff at the ASC to make arrangements for a personal tutor.

The person who helps you is there to **help** you find your mistakes, not to do the your homework problems for you. They will be most helpful when you can show them the clear and logical sequence of steps you have used to try to solve the problems. Simply showing them an answer that the computer has told you is incorrect will not be beneficial for either you or them. However, if you have your work clearly laid out, you can discuss the problem and perhaps discover where the math mistake or misconception lies. Please see the "one page per problem" discussion above.

Tests and Exams

Tests will be given at 7:00 pm on Monday, February 19 and Monday, April 2. On the tests, you will be graded for the work shown as well as the final answer. You should show all work in a clear and logical sequence to demonstrate your problem-solving skills. The tests will be closed book and no reference material will be allowed.

The tests have been scheduled in the evening to allow students up to 2 hours to work on each test. The tests will be designed to take 50 minutes to complete. If you have a conflict at the scheduled time, you may take the test between 8am and 5pm the day of the test or the day following the test (at your convenience). Conflicts should be resolved as soon as possible, and must be resolved by the Wednesday BEFORE the test (by 5 pm).

The final exam for section 1 will be on Tuesday, May 1 at 2pm and Thursday, May 3 at 10:30 am for section 2 as scheduled by the registrar's office. There will be no alternate times for taking this exam. You will have 2 hours to complete the final exam. The format will be the same as the tests but the final will be cumulative.

Each test will count for 15% of the final grade and the final exam will count for 25%.

Grading

Homework will be assigned every Monday, Wednesday and Friday and is worth 30% of your final grade. Your completion of the reading assignments before every class, along with any in-class quizzes, will also count for 10% of your final grade. There will be 2 tests (15% each) and a cumulative final exam (25%) over the entire semester's material. No scores will be dropped.

The guaranteed grading scale is indicated below. The guaranteed grades mean that anyone with at least 90% in the class is guaranteed an A of some type, anyone with at least 80% in the class is guaranteed a B of some type, etc. We reserve the right to shift these values lower but we guarantee not to raise them.

Extra Credit

There are Physics/Engineering Seminars at 3:00 pm on many Fridays. Attending one of these seminars and submitting a 1 page, double spaced report earns you up to 10 extra homework points. To receive full credit for the paper, you must have a grammatically correct paper

which is free of spelling errors. You should include the name of the speaker, the title of the talk and the date of the seminar. Summarize what you learned from the talk and give a description of your impression of the talk. The paper is due at the beginning of the class period immediately following the seminar. The maximum extra credit for the semester for any individual is ten points. Seminars are not given every week so don't wait until the last month and assume that there will be seminars left to attend. The second such paper will receive 10 points toward the reading assignments. The maximum homework grade and the maximum reading grade is 100%. Therefore if you have a perfect homework grade, the extra credit will not benefit you. However, if you find that you are unable to do an assignment or that you are unable to complete a problem, this is an opportunity to make up some of those points.

CHEATING

Cheating is neither expected nor tolerated. The penalty for cheating on any homework or test is a zero for that work. If anyone maliciously keeps others from learning (*e.g.* removes or destroys reserve materials, takes books or notes, tampers with computers or computer accounts, *etc.*) they will receive an **F** for the course. This is a very broad clause. More detail on academic integrity can be found in the college catalog.